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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/730,174	12/08/2003	Luciano Zoso	SC13042ZC	2890

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FREESCALE SEMICONDUCTOR, INC.  
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EXAMINER
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DO, CHAT C

ART UNIT	PAPER NUMBER
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2193

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/13/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	Application No. 10/730,174	Applicant(s) ZOSO ET AL.	
	Examiner Chat C. Do	Art Unit 2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 01/11/2007; 12/08/2003; 09/11/06.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 1-5 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 6-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                                                                     |                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                         | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                                | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/08/2003</u> . | 6) <input type="checkbox"/> Other: _____                                                |

### **DETAILED ACTION**

1. This communication is responsive to Response to Election/Restriction filed 01/11/2007.
2. Claims 1-23 are pending in this application. Claims 1, 3, 5-6, and 16 are independent claims. In Amendment, claims 1-5 are withdrawn from consideration. This Office Action is made non-final.

#### ***Election/Restrictions***

3. Applicant's election with traverse of Group II claims 6-23 in the reply filed on 01/11/2007 is acknowledged. The traversal is on the ground(s) that there is a square root function found in some dependent claims in Group II are also found in Group I. This is not found persuasive because:

Group I claims 1-5 drawn to a method and circuit for computing a square root of a square value wherein Group II claims 6-23 drawn to a method and circuit for computing an arithmetic including square root and division. The approach to compute a square root of a number in Group II is not same as Group I.

The requirement is still deemed proper and is therefore made FINAL.

#### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 6-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 6, it is unclear what is the final result of the claim. Further, the claim fails to disclose the complete statement for if-condition as what if the estimated inverse is greater than the number. For examination purposes, the examiner considers only limitations producing the final computation result as the first estimated inverse.

Re claim 7, the limitation "arithmetic function is square root" is unclear how the square root function can be performed using the method of claim 6 because all the features cited claim 6 are merely used to compute an approximation of a number by determining a first iteration of the result (e.g. approximation result of an input number  $\sim f(A)$ ) and then performing an inverse of the arithmetic function on the first iteration of the result (e.g. inverse of  $\sim f(A)$ ) =  $\sim A$ ). For examination purposes, the examiner disregards the limitations cited in claim 6 for claim 7. Claims 11 and 20 have similar square root rejection; and claims 12 and 17 have similar division rejection.

Thus, claims 8-10, 13-15, 18-19, and 21-23 are also rejected for being dependent on the rejected base claims 7, 12, 17, and 20 respectively.

#### ***Claim Rejections - 35 USC § 101***

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

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7. Claims 6-23 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 6-23 cite a method and circuit for performing an arithmetic function according to a predetermined mathematical algorithm. In order for claims to be statutory, claims must either include a practical application or a concrete, useful, and tangible result. However, claims 6-23 merely disclose steps or components for performing series of mathematical operations without disclosing a practical application or a useful and tangible result. The input into the system is a number and the output of the system is also another number. Therefore, claims 6-23 are directed to non-statutory subject matter.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 6-9, 12-18, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Malinowski (U.S. 4,949,296).

Re claim 6, Malinowski discloses in Figures 1-2 a method of performing an arithmetic function to achieve a result based on a number on which the arithmetic function is performed (e.g. abstract wherein the arithmetic function is the square root function and the number is the operand A), comprising determining a first iteration of the result (e.g. col. 3 line 60 - to col. 4 line 5 wherein X(0) is the initial estimated of square

root of A); performing an inverse of the arithmetic function on the first iteration to determine a first estimated inverse (e.g. expression 7 in col. 4 wherein  $X(n)*X(n)$  as the square of the square root estimated of A); comparing the first estimated inverse to the number; if the first estimated inverse is less than the number: storing the first estimated inverse; determining a first partial iteration; determining an incremental effect of the first partial iteration on the inverse arithmetic function as applied to the first partial iteration plus the first iteration; adding the incremental effect to the first estimated inverse to provide a second estimated inverse; and comparing the second estimated inverse to the number (e.g. expression 7 as the iterative result of square root of A and expression 8 as the final result wherein the approximated error is computed and added to the iterative computation is seen in expressions 6-7 with all the parameters including  $2^{-.5*max-1}$ ).

Re claim 7, Malinowski further discloses in Figures 1-2 the arithmetic function is square root (e.g. first line of the abstract).

Re claim 8, Malinowski further discloses in Figures 1-2 the incremental effect comprises two times the first estimated inverse times the first partial iteration plus the first partial iteration squared (e.g. expression 7 with proper max parameter to yield 2 times in col. 4).

Re claim 9, Malinowski further discloses in Figures 1-2 determining the first partial iteration comprises shifting a one by a predetermined amount (e.g. inherently for multiplying an operand with multiple of 2 by shifting left).

Re claim 12, Malinowski further discloses in Figures 1-2 the arithmetic function is division (e.g. col. 2 lines 1-10).

Re claim 13, Malinowski further discloses in Figures 1-2 the incremental effect comprises one half the first iteration times the divisor (e.g. expression 2 in col. 2).

Re claim 14, Malinowski further discloses in Figures 1-2 performing an inverse function on the first iteration comprises shifting the divisor by predetermined amount (e.g. inherently for multiplying an operand with multiple of 2 by shifting right).

Re claim 15, Malinowski further discloses in Figures 1-2 determining the incremental effect comprises shifting the divisor by an amount equal to the predetermined amount minus one (e.g. expression 7 in col. 4).

Re claim 16, Malinowski discloses in Figures 1-2 a circuit for performing an arithmetic function applied to a number (e.g. Figure 1 with the abstract wherein the arithmetic function is the square root function), comprising: a comparator having a first input for receiving the number, a second input, and an output (e.g. either 54 or 45 in Figure 1); register means, coupled to the output of the comparator, for storing a current estimate of the arithmetic function as applied to the number (e.g. 46); storage means for storing an inverse of the arithmetic function of the current estimate (e.g. 52); incremental means for providing an incremental effect, wherein the incremental effect is a value that when added to the inverse of the mathematical function of the last estimate is equal to the inverse function of a next estimate (e.g. expression 7 in col. 4); and summing means, coupled to the second input of the comparator, for adding the incremental effect to the inverse of the arithmetic function of the current estimate (e.g. 56 in Figure 1).

Re claim 17, it is a circuit claim of claim 12. Thus, claim 17 is also rejected under the same rationale as cited in the rejection of rejected claim 12.

Re claim 18, it is a circuit claim of claim 14. Thus, claim 18 is also rejected under the same rationale as cited in the rejection of rejected claim 14.

Re claim 20, it is a circuit claim of claim 7. Thus, claim 20 is also rejected under the same rationale as cited in the rejection of rejected claim 7.

### *Conclusion*

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. U.S. Patent No. 6,321,245 to Cukier et al. disclose a method and system for performing fast division using non linear interpolation.
- b. U.S. Patent No. 5,517,439 to Suzuki et al. disclose an arithmetic unit for executing division.
- c. U.S. Patent No. 5,016,210 to Sprague et al. disclose a binary division of signed operands.
- d. U.S. Patent No. 4,381,550 to Baker discloses a high speed dividing circuit.
- e. U.S. Patent No. 5,493,523 to Huffman discloses a mechanism and method for integer divide involving pre-alignment of the divisor relative to the dividend.
- f. U.S. Patent No. 6,546,409 to Wong discloses a digital processing.
- g. U.S. Patent No. 6,138,138 to Ogura discloses a high speed multiple determination apparatus.
- h. U.S. Patent No. 4,760,550 to Katzman et al. disclose a saving cycles in floating point division.



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- i. U.S. Patent No. 6,163,791 to Schmookler et al. disclose a high accuracy estimates of elementary functions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chat C. Do whose telephone number is (571) 272-3721. The examiner can normally be reached on M => F from 7:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chat C. Do  
Examiner  
Art Unit 2193

March 10, 2007

